Preliminary Draft

Observed and Unobserved Risk Selection in Employer-Sponsored Health Plans

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Sean Nicholson
Daniel Polsky
Kate Bundorf
Rebecca Stein

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Abstract:

Most existing studies that of risk selection in the employer-sponsored health insurance market are case studies of a single employer or employer coalition in a single market. We examine risk selection in the employer-sponsored market by applying a "switcher" methodology to a national, panel data set of enrollees in employer-sponsored health plans. We find that people who switched from a non-HMO to an HMO plan used 23 percent fewer medical services in the period prior to switching than people who remained in the non-HMO plan, and that this relatively low use persists once they enroll in an HMO. Furthermore, people who switch from an HMO to a non-HMO plan used 40 percent more medical services in the period prior to switching than people who remained in the HMO plan. The risk selection effects are substantial in magnitude, especially since about one-quarter of the people with a choice of plan types (HMO and non-HMO) actually switched types over a two-year period.

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Introduction

Managed care health plans currently cover about 90 percent of the people who receive employer-sponsored health insurance. Health plans often have incentives to design their plan to attract low-risk enrollees and repel high-risk enrollees. It has been argued that a health insurance market providing both managed care and non-managed care plans may be inefficient because managed care plans may be more likely to implement such strategies, resulting in too few people in non-managed care plans (Cutler and Zeckhauser, 1998). In fact, a number of studies have shown that Medicare HMOs attract a disproportionate share of the healthy elderly population (Eggers, 1980; Eggers and Prihoda, 1982; Brown *et al*., 1993; and Cox and Hogan, 1997). Unlike the Medicare risk selection studies that are national in scope, the studies of risk selection in the employer-sponsored health insurance market examine single employers or employer coalitions and the available evidence is mixed. Cutler and Zeckhauser (1998) found substantial favorable risk selection among state government employees in Massachusetts in the HMO plan over the fee-for-service plan. Altman, Cutler, and Zeckhauser (2000), examining the same data set, find that almost half of the expenditure difference between indemnity and HMO plans for eight medical conditions is due to a lower incidence rate among HMO patients (favorable risk selection), with the remaining difference due to lower provider reimbursement rates. In contrast, the RAND Health Insurance Experiment did not find that a Seattle HMO experienced a favorable selection of patients (Manning *et al*., 1987), and Polsky and Nicholson (2002) found that HMOs were not experiencing favorable selection with respect to non-HMOs using national data.

Eighty percent of the non-elderly who had health insurance in 1999 received it from their employer or from family member's employer.[1] Risk selection can occur because only one percent of U.S. employers adjust an employee's premium contribution to reflect her unique expected costs in that plan (Kennan *et al*., 2001). As a result, most young healthy workers pay the same premium as older less healthy workers, and workers with strong (unobserved) preferences for medical care pay the same amount as their colleagues. A worker's premium will therefore depend on the average expected cost of all

[1] Current Population Survey, 1999.

enrollees in a plan rather than merely on a person's own expected costs (Cutler and Zeckhauser, 1998). If health insurers design their plans to attract the relatively profitable, low-risk enrollees, an inefficient allocation of individuals to plans may result since some people who would enroll in a more expensive plan (usually a non-HMO) if premiums were risk adjusted to reflect their unique expected costs will enroll instead in a less expensive plan (usually an HMO).

Even though few firms formally risk adjust their employees' premium contributions, risk selection may still be limited. An estimated 20 percent of the employer-sponsored market is enrolled in self-insured plans where health insurance companies often receive a fixed payment per employee to administer the plans rather than bearing the financial risk (McDonnell and Fronstin, 1999; InsterStudy, 2000). Furthermore, about 50 percent of the people insured in the employer-sponsored market were offered a plan or a choice of plans from a single insurance carrier. In these two situations health plans have no incentive to design plans to attract low-risk employees. Some firms may also be implementing implicit (to the analyst) risk adjustment by setting the employer's contribution for plans experiencing adverse selection higher than the employer's contribution for plans experiencing favorable risk selection.

Since many employers have instituted measures to mitigate incentives for health plans to target low-risk enrollees, the results from these case studies may not be representative of national conditions. In this paper we examine whether managed care plans experience favorable risk selection in the employer-sponsored market by applying a "switcher" methodology to a recently released national, panel data set of enrollees in employer-sponsored health plans. All of the studies cited above that examine the non-elderly, employer-sponsored market with the exception of Polsky and Nicholson (2002) are case studies of a single employer or employer coalition in a single market. The switcher methodology involves a comparison of medical expenditures in the initial year of people who chose to switch from a non-HMO (indemnity or preferred provider organization) to an HMO plan versus the expenditures in the initial year of the people who remained in the non-HMO plan both years (and likewise for people who initially were enrolled in an HMO). In addition, we further decompose risk selection into its observed (to the health

plan and employer) and unobserved components, which indicates whether risk adjusting peoples' premiums based on observed characteristics will minimize or eliminate selection.

We find that people who switched from a non-HMO to an HMO plan used 23 percent fewer medical services in the period prior to switching than people who remained in the non-HMO plan, and that this relatively low use persists once they enroll in the HMO, relative to those already enrolled in the HMO. We also find that people who switch from an HMO to a non-HMO plan used 40 percent more medical services in the period prior to switching than people who remained in the HMO plan. This relatively high use rate does persist once they enroll in the non-HMO, but the differential is not statistically significant. The magnitude of the selection effects are substantial, especially when combined with our findings that about one-quarter of the people with a choice of plan types actually switched types between the first and second rounds of the Community Tracking Study Household Survey (CTSHS).

Empirical Methodology

We define risk selection as the difference in medical resource use between HMO enrollees and non-HMO enrollees due to differences in enrollees' characteristics, and therefore their demand for medical services, but not due to differences in the design and management of the two plan types. If we compare resource use for people who have chosen to enroll in an HMO to people who have chosen to enroll in a non-HMO plan, we cannot determine how much of the difference is due to enrollee characteristics and how much is due to differences in how the plans are managed. We examine people for two years and compare *first period* medical resource use between people who were initially enrolled in a non-HMO and switch to an HMO in the second period to those who remain in a non-HMO plan, and likewise for people initially enrolled in an HMO. By comparing resource use when the two sets of individuals were enrolled in the same type of plan, expenditure differences can be attributed to differences in demand for medical services due to differences in health and preferences for medical care, rather than differences in cost sharing or the extent of the plans' utilization management efforts. Since we examine risk selection only for people who switch from a non-HMO to an HMO or from an HMO to a non-HMO,

we estimate a *marginal* risk selection measure – relevant for the enrollees switching plan types -- rather than an average risk selection measure – relevant for all enrollees.

We derive separate estimates of risk selection for those who start in an HMO plan and for those who start in a non-HMO plan. We aggregate medical resource use into a single expenditure measure using unit prices for each type of service (e.g., price per hospital day, price per physician visit). Consider a sample of people who were enrolled in a non-HMO plan in the first period and were offered both a non-HMO and an HMO by their employer in the second period. Using ordinary least squares, we estimate the difference in first period medical expenditures between those who switch to an HMO in the second period and those who stay:

$$(1) \qquad Y_{i1} = \beta_0 + \beta_1 S_i + \beta_2 \mathbf{X}_i + \varepsilon_i$$

Y_{i1} are medical expenditures for person i in the first period, measured in dollars, S_i is an indicator that equals one for people who switch to an HMO in the second period, and **X** are individual and firm characteristics that could potentially be observed by an employer and used to risk adjust premiums.

If β_1 is negative in the non-HMO regression (people initially enrolled in a non-HMO), then HMO plans experience favorable risk selection relative to the non-HMO plans. Among the population who are not already enrolled in an HMO, HMOs attract people with relatively low medical expenditures. We repeat the analysis for people who were initially enrolled in an HMO in the first period, where S_i is now an indicator that equals one for people who switch to a non-HMO. A positive β_1 coefficient in the HMO regression (people initially enrolled in an HMO) would indicate that non-HMOs are experiencing adverse selection relative to HMOs. Among the population who are not already enrolled in a non-HMO plan, non-HMOs attract people with relatively high medical expenditures.

We restrict the samples in the above two regressions to people who could choose either an HMO or a non-HMO in the second period, because we want to focus on the population where plan selection is the least costly; choosing the optimal plan type does not entail switching jobs or convincing an employer to offer a more extensive menu of plans. However, some people in our sample had a constrained choice

of health plan types in the initial period -- they were either offered an HMO plan only or a non-HMO plan only -- and then had a choice of plan types in the second period. Among those unconstrained in their ability to choose their type of health plan in the initial observation period, much of the sorting of risk between managed care and non-managed care may have already taken place in previous years. To capture this effect, we include an indicator C that equals one for people who were offered both an HMO and a non-HMO in period 1, and we create a separate risk selection estimate for people who had choice in the first period (β_1) and people who were offered either an HMO or a non-HMO in the first period but not both (β_2):

$$(2) \qquad Y_{i1} = \beta_0 + \beta_1 S_{i,C=1} + \beta_2 S_{i,C=0} + \beta_3 \mathbf{X}_i + \beta_4 C_{i1} + \varepsilon_i$$

We would expect more pronounced risk selection among those who move from a constrained environment (C = 0 in the first period) to an unconstrained environment. That is, if HMOs experience favorable risk selection we would expect β_1 to be negative in the non-HMO regression and β_2 to be negative and larger than β_1, in absolute value. In the HMO regression, we would expect β_1 to be positive and β_2 to be positive and larger than β_1 if non-HMOs are experiencing adverse selection.

If the difference in medical expenditures between those switching and those remaining in their initial plan type can be observed and predicted by an employer, an employer can adjust the premiums to ensure that all employees are equally profitable from a health insurer's perspective. To explore this, we first estimate equation (2) without any enrollee characteristics **X**. We then estimate equation (2) with an indicator variable for an employee's gender and a set of indicators for their age. If β_1 and β_2 are significant without controlling for age and gender but insignificant once these characteristics are included in the regression, this implies that employers can mitigate risk selection by adjusting the employee's premium for their age and gender. That is, health plans would not have incentives to design their plans to attract people who expect to be relatively low users of medical services, because the premiums would be adjusted such that the expected profit would not vary across employee types. We also estimate equation (2) with a more comprehensive set of possible risk adjusters such as self-reported health, income level,

size of firm, marital status, and the presence of children to see if risk selection would persist with a more sophisticated risk adjustment system. This specification probably includes more information than an employer would have for purposes of adjusting premiums, but we present it as an extreme case. If risk selection is based on observable enrollee characteristics only, then health insurance premiums could be risk adjusted to prevent plans from designing their plans to attract the most profitable employees. If risk selection is based on unobserved characteristics, on the other hand, then other policies such as a patient bill of rights that restrict plan design, may be useful.

We also examine medical expenditures in the second period to see if people who switch plan types have higher or lower expenditures relative to the group of enrollees they join. If, for example, HMOs attract relatively low users of medical care among the people initially enrolled in non-HMO plans but these enrollees have second period-expenditures that are similar to those initially enrolled in an HMO, then risk selection may lower the profitability of non-HMOs but it will have little effect on the profitability of HMOs. This would be the case if the first period expenditure differences are due to negative or positive health shocks that do not persist in the second period. We run two regressions similar to equation (2), where the dependent variable is now an enrollee's medical expenditures in the second period, and the two samples are people enrolled in a non-HMO plan in the second period and people enrolled in an HMO in the second period.

Data

We use data from the first (1996-1997) and second (1998-1999) rounds of the Community Tracking Study Household Survey (CTSHS). Each survey was administered to more than 60,000 people and was designed to be representative of the civilian noninstitutionalized population in 60 U.S. communities and the country as a whole (Kemper *et al*., 1996). We focus our analysis on the 11,672 non-elderly persons who were surveyed and received employer-sponsored health insurance in both rounds. We restrict our sample to individuals who were surveyed in both rounds and received health insurance from their employer or the employer of a household member in both years of the survey. The CTSHS

attempted to re-survey all round 1 respondents by calling the respondents' telephone numbers used in round 1. A person who changes his telephone number, perhaps because he moved to another metropolitan area or residence within the same metropolitan area, would not be included in our sample. Of the 34,029 people who were non-elderly and receiving employer-sponsored health insurance in round 1 of the CTSHS, only 11,672 were re-surveyed and were still receiving employer-sponsored health insurance in round 2.

In the appendix we report coefficient estimates of a logit regression that equals one if the round 1 respondent who was eligible from our perspective was re-surveyed and still eligible in round 2. Many of the coefficients are statistically significant, which indicates non-random non-responses. As expected, people who we would expect to be relatively transient, and therefore to change telephone numbers during a two-year time period, were less likely to be re-surveyed: people between the ages of 18 and 55, non-married individuals, non-whites, and people with relatively low levels of education and income. People who used medical services relatively intensely were also less likely to be re-surveyed. Our results on risk selection apply, therefore, only to a relatively stable sub-population; we cannot extrapolate our findings to the general employer-sponsored population. However, it is not obvious, to us at least, whether our risk selection estimates are biased and, if so, whether they are biased toward or against finding favorable risk selection for HMOs. That is, non-respondents who expect to use a relatively large amount of medical services may favor either HMOs or non-HMO plans.

The four key variables for this study are the characterization of HMO and non-HMO plans, the definition of a person who has a choice of plan types, the definition of a person who switches plan types, and a person's estimated medical expenditures. CTSHS respondents were asked to define their plan as being an HMO or not.[2] This question should result in preferred provider organizations (PPOs) being grouped with non-HMO plans, so we are essentially comparing lightly managed non-HMO plans (indemnity and PPO) versus more strictly managed plans (point-of-service and HMO plans). We estimate

[2] If necessary, an interviewer elaborated as follows: "With an HMO, you must generally receive care from HMO doctors; otherwise, the expense is not covered unless you were referred by the HMO or there was a medical emergency."

the risk selection among the sub-sample who was offered a choice of plan types in the second round of the survey. We define those with a choice of plan type as all members of a household in which the main health plan policyholder had the opportunity to select either an HMO plan or a non-HMO from his or her employer. We also consider household members to have choice if one member (usually a spouse) was offered an HMO plan only and another member a non-HMO plan only. A "switcher" is defined as an individual who is enrolled in an HMO plan in round 1 and a non-HMO plan in round 2, or in a non-HMO plan in round 1 and an HMO in round 2.

The CTSHS records medical service use (e.g., number of physician visits, number of hospital days), but not medical expenditures. Since we want an aggregate measure of medical use, we estimate medical expenditure by applying resource weights per unit of medical care (i.e., unit prices) for each of the reported medical services, as was done in Polsky and Nicholson (2002), Manning *et al*. (1985) and Goldman *et al.* (1998). The resource use weights are estimated from the 1996 Medical Expenditure Panel Survey (MEPS), and for both survey rounds we use the non-HMO prices. Sample means and standard deviations are presented in Table 1.

Results

In Table 2 we categorize respondents according to whether they had a choice of health plan types in each round and the plan they actually chose. The rows of Table 2 refer to the first round and the columns to the second. The first entry of each "cell" indicates the mean medical expenditures for those respondents in the first round, and the second entry in brackets indicates the number of respondents in the cell. For example, a total of 1,897 people were offered a non-HMO only plan by their employer in both round 1 and round 2, and these people had medical expenditures in round 1 of $1,878, on average. People who switch plan types among those offered a choice in round 2 are listed in bold, and the percentage switching among those offered a choice of plan types in round 2 is reported in the final column.

Almost half of the sample had no choice of plan type in round 1. That is, they were offered either a non-HMO only (row 1) or an HMO only (row 2) by their employer in round 1. A number of these

people were offered a choice plan types in round 2 (column 3 and column 4 of rows 1 and 2), and a fairly large percentage of these people who were able to switch plan types between round 1 and round 2 did so. For example, 183 of the 726 people (25.2 percent) who were offered an HMO only in round 1 and were offered both types in round 2, switched to a non-HMO. These switchers had medical expenditures in round 1 that were $1,001 higher than the people who were in an HMO in round 1, were also offered a choice in round 2, and chose to remain in an HMO. The switcher coefficient in the regression will be identified based on this difference in first-round expenditures, either with or without other covariates. This indicates that non-HMOs are experiencing adverse selection among this sub-population that was enrolled in an HMO in round 1. In row 1, however, it appears that HMOs are also experiencing adverse risk selection, since the people switching from a non-HMO to an HMO had higher round 1 expenditures ($2,020 versus $1,628).

People who were offered a choice of plan types in both rounds (column 3 and 4 of row 3 and 4) are less likely to switch plan types than those who were constrained in round 1, as expected, although more than one-sixth of the people did switch. HMOs appear to be experiencing favorable selection among people with a choice of plan type in round 1. These descriptive measures of risk selection do not distinguish whether the selection is based on observed and/or unobserved characteristics, nor do they control for the respondent's market.

Respondents who had private insurance in round 2 of the survey and had switched plans (not necessarily plan types) in the last 12 months were asked why they had switched plans. Respondents could report more than one reason. In Table 3 we report data on the self-reported reasons why people switched plans among those who also switched plan types (HMO to non-HMO or non-HMO to HMO) between round 1 and round 2 of the CTSHS survey. Since two years elapsed between survey rounds, if respondents in round 1 switched plans in the first year following the first survey, they would not have been asked this question. The most common reasons for switching plans were because of employment changes or changes in the employer's plan offerings. It is not clear from the questions whether the respondent changes firms in part due to sub-optimal health insurance, or whether the respondent and her

colleagues convinced their employer to change the offerings. People who were enrolled in an HMO in round 1 and switched to a non-HMO were, surprisingly, more likely to indicate that they changed because the non-HMO is less expensive than for people making the reverse switch.

We present our risk selection estimates in Table 4. The sample for the regressions in the first three columns of the table are individuals enrolled in a non-HMO in the first round who had a choice of plan types in round 2 (people in row 1 and row 3 of Table 2). In the first column we regress an individual's medical expenditures in the first round of the survey on a set of 60 market indicator variables but no personal characteristics, in order to measure risk selection if firms engage in no formal or informal risk adjustment of premiums. People who switched from a non-HMO to an HMO plan and had a choice of plan types in the first round used $499 fewer medical resources in the first round, or 27 percent less than the non-HMO average, than those who remained in a non-HMO plan. Among the people who were offered an HMO in the second round but not the first round, those who switched to an HMO actually used more medical services, although this effect is not statistically significant. Surprisingly, the risk selection is stronger (more favorable for HMOs) among individuals who in round 1 were offered a choice between an HMO and non-HMO relative to people who were only offered a non-HMO by their employer in round 1. The former group presumably is more experienced at evaluating plan types than the latter group.

In the second column of Table 4 we add indicator variables for gender and age to see if the differences in medical utilization between those who do and do not switch plan types are due to differences in enrollee characteristics that could be observed by an employer and used to adjust premiums.[3] If those switching from a non-HMO to an HMO have lower expenditures because they are male and relatively young, characteristics associated with lower predicted medical expenditures, then employers could pay plans less when they enroll these workers. Although gender and age do affect first round medical expenditures, as can be seen in column 2 of Table 4, HMOs still benefit from favorable risk selection. This implies that selection occurs based on unobserved preferences for medical care and/or

[3] Medicare, for example, adjusts HMO premiums based on gender, age, Medicaid eligibility, and whether the person is institutionalized.

characteristics that are more difficult for employers to observe. In fact, the coefficient on the indicator variable for people who had a choice of plan types and switched to an HMO is insignificant when we include in column 3 an extensive set of individual and firm characteristics, such as self-reported health status, marital status, household structure (e.g., married with children), race, education, household income, type of employer (i.e., private or government), and number of employees at the person's firm. This result indicates that a more sophisticated risk adjustment system may be able to eliminate incentives for plans to design benefits in order to attract the most profitable enrollee types.

The sample in the final three columns of Table 4 contain individuals who were in an HMO in the first round and had a choice of plan types in the second round (people in column 3 and column 4 of row 2 and row 4 of Table 2). People who did not have a choice of plan type in round 1 and switched to a non-HMO in round 2 had first-round medical expenditures almost $1,000 higher (48 percent higher) than those who remained in an HMO. The magnitude of the non-HMOs adverse risk selection decreases slightly ($825) when we add a full set of potential risk adjusters in the sixth column, but is still economically meaningful. Apparently HMO enrollees with strong, unobserved preferences for medical care and/or unobserved poor health who also had a constrained choice set, prefer non-HMOs once they are given the choice. In our sample there were 183 people who made such a switch, which represents about seven percent of non-HMO enrollment in round 2 among those with a choice of plan types. People who switched from HMOs to non-HMOs and had a choice of plan types in the first round (the first row of Table 4) used medical services at the same rate as those who stayed; the switcher coefficient is not statistically significant.

The results presented in Table 4 indicate that people who were offered an HMO only in the first round of the survey, were offered both plan types in round 2, and chose a non-HMO in round 2 had much higher expenditures than people who remained in an HMO, even when we control for an extensive set of observed characteristics. This raises the question of whether people with strong preferences for medical care and/or unobserved poor health seek out jobs that offer a choice of plan types or convince their employer to offer both types. Put differently, we measure risk selection among people with a choice of

plan types in round 2, but having a choice of plan types may be endogenous with respect to a person's expected use of medical services.

To explore this possibility, in Table 5 we present coefficient estimates of a probit regression where the dependent variable is one if a person's employer offered both an HMO and a non-HMO in round 2, and is zero otherwise. We regress this on indicator variables if a person was offered a choice in round 1 and if they were offered a non-HMO plan only (being offered an HMO only is the omitted group), a person's predicted first-round medical expenditures, and the difference between the person's actual and predicted first-round expenditures. We predict first round medical expenditures using the same extensive set of personal and employer characteristics we included in the regressions from column 3 and column 6 of Table 4. The difference between a person's actual and predicted first-round expenditures, the error term from the regression of the determinants of medical expenditures, measures a person's preferences for medical care and unobserved determinants of medical resource use.

As expected, people who were offered a choice of plan types in round 1 were also likely to be offered a choice two years later. Controlling for predicted and unobserved medical resource use, individuals offered an HMO only in round 1 were more likely than people offered a non-HMO only to have a choice of plan types in round 2. Perhaps the former group is more motivated to switch plan types than the latter group, or they could be employed in industries whose plan offerings were evolving differently for reasons unrelated to worker preferences for health insurance. People with relatively high predicted medical expenditures, based on observed characteristics of the individual and the employer, were not more likely to have a choice of plan type than their colleagues. However, individuals with relatively high resource use in round 1 associated with unobserved characteristics were more likely to have a choice of plan types in round 2.[4] For example, a one-standard deviation increase in a person's idiosyncratic medical expenditures is associated with a 2.2 percentage point increase in the probability of having a choice of plan types in round 2 (from 0.534 to 0.556) for a representative person.

[4] If we interact unobserved medical expenditures with a person's choice of plan types in round 1, the interaction terms are not statistically significant.

Our analysis indicates that people switching from HMOs to non-HMOs tend to have relatively high medical expenditures, and people switching from non-HMOs to HMOs tend to have relatively low medical expenditures. However, if these expenditure differences are not persistent, then risk selection may not affect health plan profits and may not cause distortions in plan design. In Table 6 we present coefficient estimates of the determinants of medical resource use in the second round of the survey. The structure of the regressions is similar to Table 4: the sample for the first three regressions are people with a choice of plan types in round 2 who enrolled in a non-HMO in round 2, and the sample for the second three regressions are people with a choice of plan types in round 2 who enrolled in an HMO in round 2.

In Table 4 we report that people who were enrolled in an HMO in round 1, did not have a choice of plan types in round 1, and switched to a non-HMO in round 2 had first-round medical expenditures that were $825 higher than those who did not switch, conditional on a full set of personal and firm characteristics. In the second row of the first three columns of Table 6, we see that these switchers had second-round medical expenditures that were about $700 higher than the people who were enrolled in a non-HMO plan for both rounds. The standard errors on these coefficients are large, however, so this difference is not significantly different from zero.

In Table 4 we report that people who were enrolled in a non-HMO in round 1, had a choice of plan types in round 1, and switched to an HMO in round 2 had first-round medical expenditures that were $240 to $432 lower than those who did not switch, depending on whether we condition on gender and age only or a full set of personal and firm characteristics. In the first row of columns 4-6 of Table 6, we see that the relatively low medical costs for these switchers did persist in the second-round; their medical expenditures were about $400-$500 lower than the people who were enrolled in an HMO plan for both rounds. Even with a sophisticated risk adjustment system, HMOs would appear to be able to benefit from favorable risk selection.

Conclusions

Almost all of the existing studies that measure risk selection in the non-elderly, employer-sponsored health insurance market are case studies of a single employer or employer coalition in a single market, and most use data from the 1980s or early 1990s. Since many employers have mitigated the incentive for health plans to target low-risk enrollees by self-insuring and/or by offering a variety of health plans from a single insurance company, the results from these case studies may not be representative of national conditions. In this paper we examine whether HMOs experience favorable risk selection in the employer-sponsored market by applying a "switcher" methodology to a national, panel data set of enrollees in employer-sponsored health plans.

We find that people who switched from a non-HMO to an HMO plan used 23 percent fewer medical services in the period prior to switching than people who remained in the non-HMO plan, and that this relatively low use persists once they enroll in the HMO, relative to those already enrolled in the HMO. Furthermore, we find that people who switched from an HMO to a non-HMO plan used 40 percent more medical services in the period prior to switching than people who remained in the HMO plan. This relatively high use rate does persist once they enroll in the non-HMO, but the differential is not statistically significant. The magnitude of the selection effects are substantial, especially when combined with our findings that about one-quarter of the people with a choice of plan types actually switched types between the first and second rounds of the CTSHS survey.

Our results, from a national data set, are generally consistent with switcher studies that have used a single employer or a coalition of employers in a single market. Altman, Cutler, and Zeckhauser (1998), for example, find that people switching from an indemnity to an HMO plan spent 36 percent less on medical care than those remaining in the indemnity plan, and people switching from an HMO to an indemnity plan spent 47 percent more than those remaining in the HMO. Jackson-Beeck and Kleinman (1983) find that people enrolling in an HMO when it was offered for the first time had an average of 53 percent fewer hospital days in the indemnity plan relative to people who remained in the indemnity plan.

Our finding of favorable risk selection for HMOs and adverse risk selection for non-HMOs differs from the RAND study and the study by Polsky and Nicholson (2002), studies that estimate average

rather than marginal risk selection measures. As part of the RAND Health Insurance Experiment, people were randomized to a Seattle HMO and their medical utilization was compared to people who chose to enroll in the same HMO. Differences in utilization would be due, therefore, to differences in the demand for medical care rather than plan design. Manning *et al.* (1987) found no difference in the use of medical services between the two groups. Likewise, Polsky and Nicholson (2002) found no evidence of risk selection using the first wave of the CTSHS. They decompose differences in expenditures between HMO and non-HMO enrollees into a utilization, reimbursement, and risk selection effect, where the latter effect is measured as a residual. The switcher methodology generates a *marginal* risk selection estimate, since we identify the risk selection coefficients by the people who switch plan types. If the people who remain in an HMO, for example, use slightly more medical services than people who remain in a non-HMO, then the *average* risk selection measure may in fact be zero.

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Table 1

Sample Means and Standard Deviations (n = 11,672)

Round 1 Variables	Mean	Standard Deviation
Medical resource use ($000):		
- 1st round (1996-1997)	$1,859	$4,317
- 2nd round (1998-1999)	$1,644	$3,883
Individual and firm characteristics from round 1:		
Age		
Under 2 years	0.017	0.129
2-17	0.188	0.391
18-39	0.340	0.474
40-55	0.367	0.482
56-64	0.087	0.283
Female	0.526	0.499
Marital status:		
- single, with children	0.071	0.256
- single, no children	0.130	0.336
- married, no children	0.210	0.407
- married, with children	0.590	0.492
Race:		
White	0.843	0.364
African American	0.071	0.257
Asian	0.031	0.174
Hispanic	0.055	0.228
Education:		
Less than high school	0.242	0.428
High school graduate	0.264	0.441
College graduate	0.383	0.486
Masters degree	0.111	0.315
Self-reported health:		
- excellent	0.347	0.476
- very good	0.398	0.490
- good	0.197	0.398
- fair	0.049	0.215
- poor	0.009	0.094
Household income:		
- below $10,000	0.051	0.220
- $10,000 - $49,999	0.431	0.495
- $50,000 - $99,999	0.430	0.495
- $100,000+	0.088	0.283
Employer:		
- government	0.219	0.413
- fewer than 10 employees	0.102	0.302
- 10-1000 employees	0.325	0.468
- 1000+ employees	0.355	0.479

Table 2

Health Plan Offerings, Choices, and Medical Use in Round 1 and Round 2 of the CTSHS Survey

Top entry: mean medical use in Round 1
Second entry: [number of enrollees]
People who switched plan types and had a choice of plans in Round 2 are in **bold**.

	Health Plan in Round 2					
Health Plan in Round 1	Non-HMO, No Choice	HMO, No Choice	Non-HMO, Choice	HMO, Choice	Total	Percentage Switching Plan Types if Offered a Choice in Round 2
Non-HMO, not offered choice	$1,878 [1,897]	$1,525 [684]	$1,628 [550]	$2,020 [**325**]	$1,782 [3,456]	37.1%
HMO, not offered choice	$1,349 [493]	$1,820 [1,223]	$2,861 [**183**]	$1,860 [543]	$1,812 [2,442]	25.2%
Non-HMO, offered choice	$1,715 [293]	$2,057 [188]	$2,040 [1,546]	$1,511 [**513**]	$1,897 [2,540]	24.9%
HMO, offered choice	$1,677 [178]	$1,619 [481]	$2,121 [**426**]	$2,009 [2,149]	$1,948 [3,234]	16.5%
Total	$1,758 [2,861]	$1,722 [2,576]	$2,024 [2,705]	$1,915 [3,530]	$1,859 [11,672]	

Table 3

Reasons People Switched Plan Types Between Round 1 and Round 2 of the CTSHS Survey

	Enrolled in a non-HMO in round 1 of survey (n = 160)	Enrolled in an HMO in round 1 of survey (n = 125)	Total (n = 285)
Respondent or respondent's spouse switched jobs	35.0%	26.4%	31.2%
Employer changed plan offerings	34.4%	39.2%	36.5%
Current plan is less expensive	10.0%	21.6%	15.1%
Current plan has better services	12.0%	18.4%	14.0%

Notes: respondents who had private insurance in round 2 of the survey and had switched plans (not necessarily plan types) in the last 12 months were asked why they had switched plans. Respondents could report more than one reason. In this table analyze the responses for people who also switched plan types (HMO to non-HMO or non-HMO to HMO) between round 1 and round 2 of the CTSHS survey. Since two years elapsed between survey rounds, if respondents in round 1 switched plans in the first year following the round 1 survey, they would not have been asked this question.

Table 4: Risk Selection Based on Medical Care Use in Round 1

Variable	**Sample**: enrolled in a non-HMO in round 1 and had a choice of plan types in round 2			**Sample**: enrolled in an HMO in round 1 and had a choice of plan types in round 2		
Switched plan types and:						
- had a choice in round 1	-499**	-432**	-240	163	209	129
(β_1 from equation (2))	(177)	(170)	(166)	(264)	(259)	(253)
- did not have a choice	452	356	435	987**	902**	825**
of types in round 1	(345)	(333)	(317)	(448)	(431)	(411)
(β_2 from equation (2))						
Was not offered a choice	-451**	-354*	-312	-156	-85.7	-161
of plan types in round 1	(210)	(208)	(205)	(237)	(235)	(218)
Female		596**	579**		711**	642**
		(156)	(149)		(156)	(148)
Age: (56-65 is omitted group)						
- under 2 years of age		3011**	4114**		4266**	5082**
		(1108)	(1211)		(921)	(1068)
- between 2 and 17		-1060**	63.3		-1856**	-1130
		(295)	(242)		(482)	(754)
- between 18 and 40		-486	70.6		-1108**	-522
		(305)	(334)		(495)	(512)
- between 40 and 55		-578*	-275		-1211**	-881*
		(315)	(335)		(487)	(484)
Other potentially observable characteristics included?	No	No	**Yes**	No	No	**Yes**
Constant	1311**	1200**	-236	2307	1418**	-1188
	(291)	(397)	(759)	(2067)	(671)	(1232)
R^2	0.02	0.04	0.13	0.03	0.07	0.17
Number of observations	2934	2934	2934	3301	3301	3301

Notes: dependent variable is medical care use in Round 1, measured in dollars. Standard errors are in parentheses. ** = significantly different from zero at the five-percent level; * = significantly different from zero at the 10-percent level. All specifications include indicator variables for the site of the survey (usually a metropolitan statistical area). Additional potentially observable enrollee and employer characteristics include: self-reported health, marital status, children, race, education, household income, type of employer (i.e., private or government), and number of employees at the person's firm.

Table 5

Probit Coefficient Estimates of Whether Person Has a Choice of Plan Types in Round 2

Variable	Coefficient Estimate	Standard Error
Plan offerings in round 1 of survey (offered only HMO is omitted group):		
- respondent was offered a choice of plan types (HMO and non-HMO)	1.36**	0.034
- respondent offered an HMO only	0.107**	0.037
Predicted first-round medical care use ($000)	0.00197	0.00992
Difference between actual and predicted first-round medical care use ($000)	0.00699**	0.00318
Constant	-0.113	0.214
Pseudo R^2	0.24	
Number of observations	11,672	

Notes: dependent variable is one if respondent was offered both an HMO and a non-HMO plan in round 2 of the survey. Regression includes indicator variables for the site of the survey (usually a metropolitan statistical area). Predicted medical expenditures based on following individual characteristics: gender, age, self-reported health status, marital status, children, race, education, and household income.** = significantly different from zero at the five-percent level; * = significantly different from zero at the 10-percent level.

Table 6: Coefficient Estimates on the Determinants of Medical Care Use in Round 2 of CTSHS Survey

Variable	**Sample**: enrolled in a non-HMO in round 2 and had a choice of plan types in round 2			**Sample**: enrolled in an HMO in round 2 and had a choice of plan types in round 2		
Switched plan types and:						
- had a choice in round 1	-73.7	-12.5	-153	-511**	-496**	-373**
	(197)	(205)	(212)	(137)	(136)	(128)
- did not have a choice of types in round 1	688	782	673	-50.7	-45.0	78.7
	(525)	(532)	(504)	(228)	(229)	(231)
Female		599**	522**		534**	546**
		(190)	(177)		(117)	(113)
Age: (56-65 is omitted group)						
- under 2 years of age		-1754**	-930		784	1480
		(502)	(994)		(952)	(1099)
- between 2 and 17		-1728**	-1115		-580**	129
		(436)	(930)		(228)	(586)
- between 18 and 40		-1190**	-600		-332	140
		(471)	(540)		(208)	(258)
- between 40 and 55		-1175**	-873**		-134	119
		(437)	(437)		(224)	(247)
Other potentially observable characteristics included?	No	No	**Yes**	No	No	**Yes**
Constant	1347**	1937**	510	514**	393**	-462
	481	(501)	(1079)	(165)	(305)	(658)
R^2	0.03	0.04	0.08	0.02	0.03	0.10
Number of observations	2705	2705	2705	3530	3530	3530

Notes: dependent variable is medical care use in round 2, measured in dollars. Standard errors are in parentheses. ** = significantly different from zero at the five-percent level; * = significantly different from zero at the 10-percent level. All specifications include indicator variables for the site of the survey (usually a metropolitan statistical area). Additional potentially observable enrollee characteristics include: self-reported health, marital status, children, race, education, and household income.

Appendix

Analysis of Response Bias for Round 2 of the Community Tracking Study Household Survey

Dependent variable is one if the person was re-interviewed in round 2, and zero otherwise

	Coefficient	Standard Error
Enrolled in an HMO	-0.153**	0.034
Offered HMO and non-HMO	-0.027	0.035
HMO * offered both plan types	0.079*	0.047
Age indicator: 18-39	-0.691**	0.040
Age indicator: 40-55	-0.159**	0.039
Female	0.062**	0.024
Marital status:		
- single, with children	-0.405**	0.046
- single, no children	-0.446**	0.036
- married, no children	-0.193**	0.033
African American	-0.369**	0.044
Asian	-0.416**	0.066
Hispanic	-0.408 **	0.049
High school graduate	0.530**	0.046
College graduate	0.476**	0.045
Masters degree	0.403**	0.054
Self-reported health:		
- very good	0.133**	0.028
- good	0.096**	0.034
- fair	0.028	0.055
- poor	0.096	0.112
Household income:		
- below $10,000	-0.248**	0.056
- $10,000 - $49,999	-0.252**	0.043
- $50,000 - $99,999	0.006	0.040
Employer:		
- government	0.051	0.033
- fewer than 10 employees	-0.088**	0.041
- 10-1000 employees	-0.036	0.029
Medical resource use in round 1	-1.6×10^{-5}**	3.22×10^{-06}
Constant	-0.362**	0.053
n	34,029	
Pseudo R^2	0.03	

Notes: ** = significantly different from zero at the five-percent level; * = significantly different from zero at the 10-percent level.